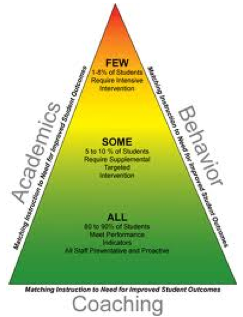
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Canyons School District

Response to Intervention (RtI)

System of Supports

K-8 Math Implementation Guide

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**Introduction to Document**

The *Canyons School District Response to Intervention (RtI) System of Supports: K-8 Math Implementation Guide* has been created to assist schools in creating structures necessary to begin the implementation of Response to Intervention (RtI). This document acts as a workbook for schools working with the Evidence-Based Learning department or as a do-it-yourself guide for teachers taking on the challenge themselves.

This document provides an explanation of why each of the components are important as well as giving some suggested steps that have helped schools successfully make decisions that support a sustainable system.

*\*Special thanks and acknowledgement to* [*www.kansasmtss.org*](http://www.kansasmtss.org) *for a major portion of this work.*

**Core Curriculum**

Background

The National Mathematics Advisory Panel (2008) delivered standards and recommendations for teaching mathematics skills that would effectively prepare students for proficiency in Algebra. One important point made by the Panel was that instruction in Pre-Kindergarten through eighth grade should be streamlined and emphasize a well-defined set of critical topics. The math curriculum should not “revisit topics year after year without bringing them to closure.” In other words, students must learn critical skills to a level of proficiency and fluency that enables automaticity in math computation and problem solving. Educators know that building fluency in reading is essential for reading comprehension. Likewise, proficiency and fluency in whole numbers, fractions, certain aspects of geometry, and measurement are essential to build proficiency in Algebra.

The National Research Council (Kilpatrick, Swafford, & Findell, 2001) defined “mathematical proficiency” as follows:

* Conceptual understanding – comprehension of mathematical concepts, operations, and relations
* Procedural fluency – skill in carrying out procedures flexibly, accurately, efficiently, and appropriately
* Strategic competence – ability to formulate, represent, and solve mathematical problems
* Adaptive reasoning – a capacity for logical thought, reflection, explanation, and justification
* Productive disposition – habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one’s own efficacy

The National Mathematics Advisory Panel (2008) found that lack of proficiency, particularly in fractions, is a major obstacle for most students. It is essential that students have conceptual and procedural knowledge of fractions and proportional reasoning and have the ability to apply this knowledge toward accurate problem solving. The IES Practice Guide on fractions (Sieigler, et al., 2010) includes five recommendations for improving students’ proficiency with fractions:

*1) Build on students’ informal understanding of sharing and proportionality to develop initial fraction concepts.*

*2) Help students recognize that fractions are numbers and that they expand the number system beyond whole numbers. Use number lines as a central representational tool in teaching this and other fraction concepts from the early grades onward.*

*3) Help students understand why procedures for computations with fractions make sense.*

*4) Develop students’ conceptual understanding of strategies for solving ratio, rate, and proportion problems before exposing them to cross-multiplication as a procedure to use to solve such problems.*

*5) Professional development programs should place a high priority on improving teachers’ understanding of fractions and of how to teach them.*

*Early Numeracy in Early Childhood: A Foundation for Later*

*Mathematic Ability*

A review of the research has found a direct link between the competencies supporting later mathematical ability and the development of early informal math concepts (Committee on Early Childhood Mathematics, National Research Council, 2009). Infants innately begin to apply concepts such as quantity and other implicit number concepts as they mature (Brannon, Abbott, & Lutz, 2004). As infants and toddlers grow in the ability to understand and use language, number words become part of their vocabulary. Subsequently, number words can then be applied in relation to objects, sets, space, and shapes. With this new and growing knowledge base, children can apply their understanding and use of number words to be used as a tool in calculation and problem solving, all of which adds to a positive mathematical trajectory (Clements & Sarama, 2007) (Jordan, Kaplan, Ramineni, & Locuniak, 2009).

Most of the skills and knowledge gained by age three are accomplished incidentally with little or no formal instruction from adults (Clements & Sarama, 2007). There are some children, however, who do not enter the preschool door with a solid understanding of numbers. Researchers have found a high correlation between mathematical ability and the socioeconomic status (SES) of children. Children from low-income families consistently lag behind their middle-income peers in their concept of numbers (Ehrlich & Levine, 2007). As children get older this gap widens in other areas of mathematical ability (Clements, Sarama, & Gerber, 2005).

Children from low-income families are less likely to be engaged in home environments that support mathematical learning through activities, conversations, materials, etc. In addition, children living in poverty often lag behind their peers in language ability, which has also been linked to the ease with which children learn to count. The good news is that early intervention in early numeracy skills improves the trajectory for future academic achievement (Jordan, 2010).

Mathematics Foundations K-12

*Early Numeracy (Grades K‐1)*

Students should be given explicit and direct instruction that guides them to fluency in early numeracy skills, including such skills as oral counting, number naming, strategic counting, magnitude comparison, ordering whole numbers, joining and separating sets, describing shapes, and ordering objects by attributes.

*Whole Numbers, Fractions, and Decimals (Grades 2-8)*

It is critical that students develop fluency with whole numbers, fractions, and decimals. In addition, students should develop a strong understanding of measurement and geometry designed to build toward fluency with algebraic concepts.

*Elementary focus on:*

 Critical foundations for Algebra

 Proficiency with whole numbers, fractions, geometry, and measurement

*Middle School focus on:*

 Symbols and expressions

 Linear equations

 Quadratic equations

 Algebra of polynomials

 Finite probability

*Advanced Math (Grades 9‐12)*

Students taking advanced math courses should be provided with instruction in the fundamental concepts of function and relation, invariance, and transformation. Students should become adept at visualizing, describing, and analyzing situations in mathematical terms, and be able to prove mathematically based ideas (National Council of Teachers of Mathematics, 2000).

Common Core State Standards: Content

The K-5 standards provide students with a solid foundation in whole numbers, addition, subtraction, multiplication, division, fractions and decimals—which help young students build the foundation to apply more demanding math concepts and procedures successfully, and move into applications. They also provide detailed guidance to teachers on how to navigate their way through knotty topics such as fractions, negative numbers, and geometry, and do so by maintaining a continuous progression from grade to grade. Having built a strong foundation in K-5, students can move to more complex work in geometry, algebra and probability and statistics in the middle grades to gain a rich preparation for high school mathematics.

Students who have completed 7th grade and mastered the content and skills through the 7th grade will be well prepared for algebra in grade 8. The high school standards call on students to practice applying mathematical ways of thinking to real world issues and challenges; they prepare students to think and reason mathematically across the major strands of mathematics, including number, algebra, geometry, probability and statistics. Note that the CCSS promote rigor not simply by including advanced mathematical content, but by requiring a deep understanding of the content at each grade level, and providing sufficient focus to make that possible.

The CCSS in mathematics lay out a vision for what all students need to master to be ready for credit-bearing college mathematics courses without remediation. Some of the high school standards are designated by a (+), indicating that they are above the college- and career requirement but necessary for students to take advanced mathematics courses in high school such as calculus, advanced statistics, or discrete mathematics, and to be prepared for Science, Technology, Engineering, and Mathematics (STEM) coursework in college.

Common Core State Standards: Practice

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education.

* The first of these are the NCTM process standards of problem solving, reasoning and proof, communication, representation, and connections.
* The second are the strands of mathematical proficiency specified in the National Research Council’s report *Adding It Up*: adaptive reasoning, strategic competence, conceptual understanding (comprehension of mathematical concepts, operations and relations), procedural fluency (skill in carrying out procedures flexibly, accurately, efficiently and appropriately), and productive disposition (habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one’s own efficacy).

1. **Make sense of problems and persevere in solving them.**

Mathematically proficient students…

* understand the context of the problem.
* plan a solution strategy.
* use manipulatives or pictures to represent the problem.
* monitor their thinking as they solve the problem.
* are flexible in approaches to solving problem (when one doesn’t work, try another).
* make connections to similar problems.
* determine reasonableness of an answer.
* understand the strategies of other students.
* make connections between strategies.

1. **Reason abstractly and quantitatively.**

Mathematically proficient students…

* demonstrate number sense.
* translate concrete and pictorial representations into symbols.
* provide real-life context for a number expression or equation (e.g. create a story problem for 3 x 5).
* recognize the meaning of the answer.

1. **Construct viable arguments and critique the reasoning of others.**

Mathematically proficient students…

* formulate an argument (e.g. How did I get my answer? Will this strategy always work?).
* communicate their strategy using pictures, numbers, or words.
* justify their conclusion (i.e. How do I know my answer is correct?).
* make conjectures based on what appears to be correct and has not yet been disproven.
* ask questions of others to clarify thinking.
* compare effectiveness of strategies.

**4. Model with mathematics.**

Mathematically proficient students…

* recognize mathematics in every day life.
* make estimations to simplify the situation.
* use diagrams, graphs, and charts to identify key ideas and draw conclusions.

**5. Use appropriate tools strategically.**

Mathematically proficient students…

* effectively use a variety of tools.
* identify which tools are appropriate in a given situation.
* use technology to deepen understanding.

**6. Attend to precision.**

Mathematically proficient students…

* communicate precisely using symbols or words.
* use vocabulary and commonly agreed upon definitions in discussions.
* calculate accurately and efficiently.

**7. Look for and make use of structure.**

Mathematically proficient students…

* discern a pattern to identify rules or properties.
* separate complicated ideas into their individual parts.

**8. Look for and express regularity in repeated reasoning**.

Mathematically proficient students…

* generalize from patterns noticed.
* look for more efficient strategies.
* identify general methods or a general formula.
* evaluate reasonableness while working the problem.

Connecting the Standards for Mathematical Practice to the Standards for Mathematical Content

The Standards for Mathematical Practice describe ways in which developing student practitioners of the discipline of mathematics increasingly ought to engage with the subject matter as they grow in mathematical maturity and expertise throughout the elementary, middle and high school years. Designers of curricula, assessments, and professional development should all attend to the need to connect the mathematical practices to mathematical content in mathematics instruction.

The Standards for Mathematical Content are a balanced combination of procedure and understanding. Expectations that begin with the word “understand” are often especially good opportunities to connect the practices to the content. Students who lack understanding of a topic may rely on procedures too heavily. Without a flexible base from which to work, they may be less likely to consider analogous problems, represent problems coherently, justify conclusions, apply the mathematics to practical situations, use technology mindfully to work with the mathematics, explain the mathematics accurately to other students, step back for an overview, or deviate from a known procedure to find a shortcut. In short, a lack of understanding effectively prevents a student from engaging in the mathematical practices.

In this respect, those content standards that set an expectation of understanding are potential “points of intersection” between the Standards for Mathematical Content and the Standards for Mathematical Practice. These points of intersection are intended to be weighted toward central and generative concepts in the school mathematics curriculum that most merit the time, resources, innovative energies, and focus necessary to qualitatively improve the curriculum, instruction, assessment, professional development, and student achievement in mathematics.

**Instruction**

**Core Instruction**

*Grades K‐12*

The core curriculum for mathematics should be based on state standards and include the following instructional practices:

 Plan for learning goals that are aligned to state standards.

 Manage classroom discourse using questioning and discussion strategies.

 Link experience and background knowledge to the abstract through written and oral communication.

 Provide for instruction in conceptual understanding, computational and procedural fluency, and problem solving, as these skills are equally important and mutually reinforce each other.

 Provide for heightened interactions and considerations of various problem-solving models with varied student groupings.

 Apply the strategic use of manipulatives, calculators, and computers to develop students’ mathematical fluency.

 Use formative assessments to plan for adjustments and modifications to the learning plan.

 Provide differentiated instruction to respond to student needs (Kilpatrick, Swafford, & Findell, 2001; National Mathematics Advisory Panel, 2008).

Mathematics core instruction should occur for 90 minutes per day. The math core should be effective with the majority of students and include differentiated instruction for students who have difficulty with math. The National Council of Teachers of Math (NCTM) recommends that students should be enrolled in a mathematics course each year in grades kindergarten – 12 (National Council of Teachers of Mathematics, 2006). Topics of study in kindergarten through eighth grade should be well established and streamlined to build proficiency in the early grades.

Students should exhibit proficiency in using whole numbers, fractions, and decimals by the end of sixth grade and be prepared for and offered Algebra instruction by eighth grade (National Mathematics Advisory Panel, 2008). A chart of the Benchmarks for the Critical Foundation of Mathematics can be found in the National Math Advisory Panel Final Report, 2008.

**Student-Centered AND Teacher-Directed**

One of the ongoing issues within the instruction of mathematics has been whether instruction should be “student-centered” or “teacher-directed.” Research does not support the use of either instructional approach alone. Rather, different forms of instructional practices can have a positive impact under certain circumstances (National Mathematics Advisory Panel, 2008). Students who struggle in mathematics need explicit and systematic instruction within the core as well as during math intervention time. Such practices should include clear examples and models, detailed feedback, and use of think-alouds (Gersten, Chard, Jayanthi, Baker, Murphy, & Flojo, 2009) (National Mathematics Advisory Panel, 2008).

It is important to provide both direct instruction and strategy instruction in math. Direct instruction occurs when teachers use sequential instruction focused on learning basic skills and information (Stein, Kinder, Silbert, & Car- nine, 2006). Strategy instruction teaches students how to access information on their own and retrieve it when it is needed. Both types of instruction are essential in developing independent learners (Hall T., 2002; Steedly, Dragoo, Arafeh, & Luke, 2008).

Direct instruction should include:

 Clearly establishing the objective,

 Activating background or prior knowledge,

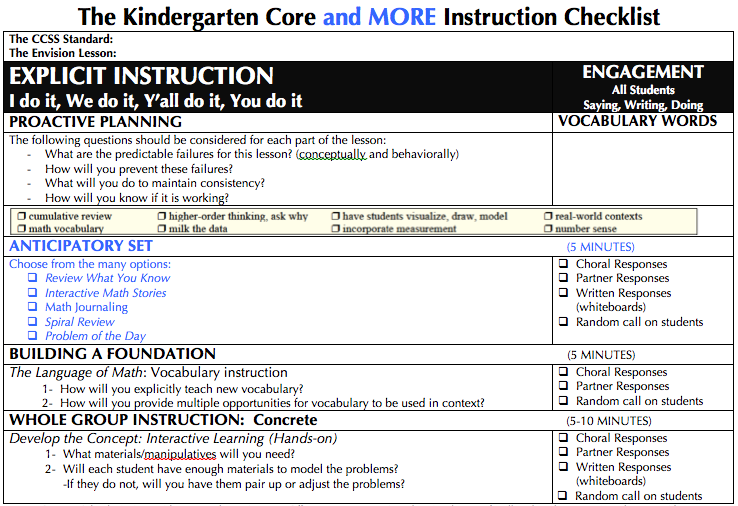
 Presenting new information in sequence,

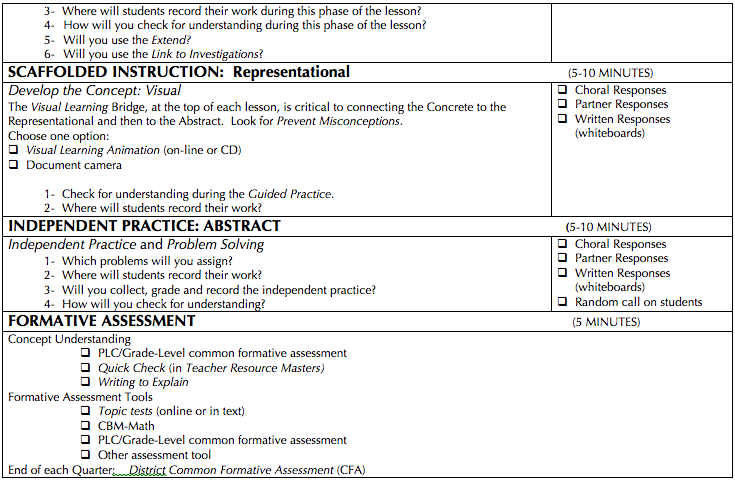
 Modeling the task,

 Using visual representations, providing guided and independent practice, and

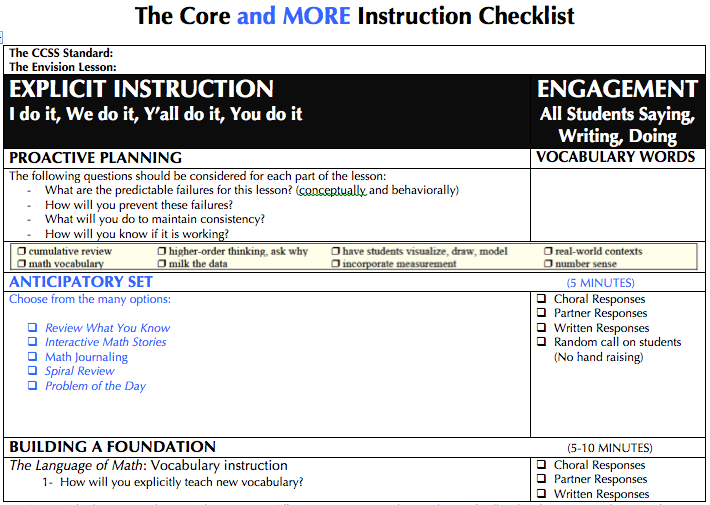
 Assessing student understanding (Deschler & Schumaker, 1993).

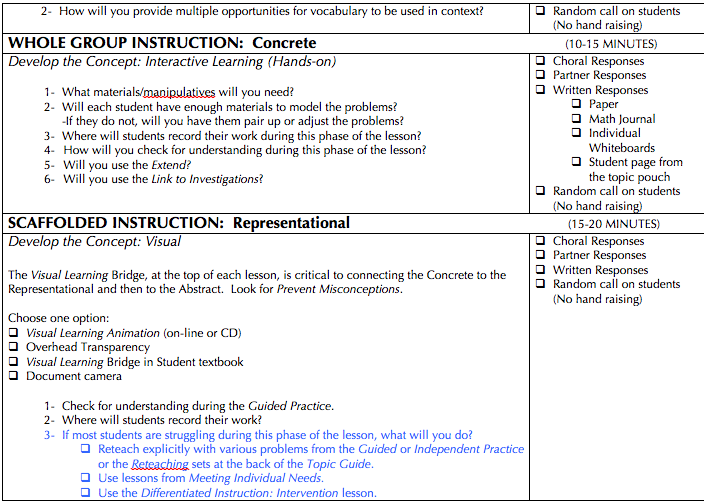
**Kindergarten Math Block:** The Core and More Instruction Checklist (Kindergarten version)

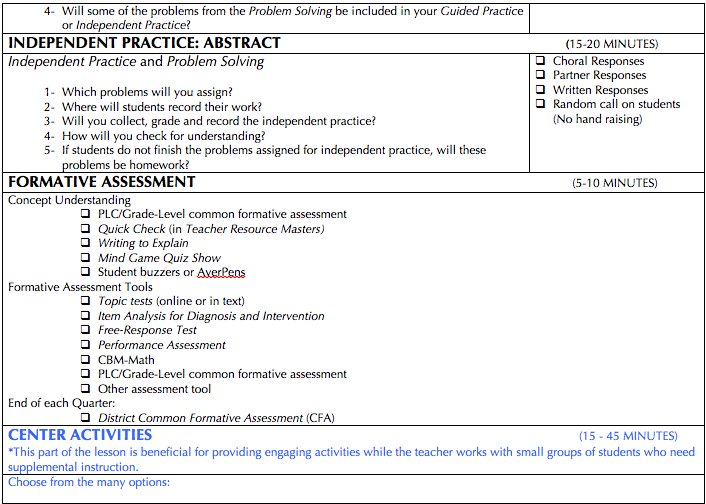


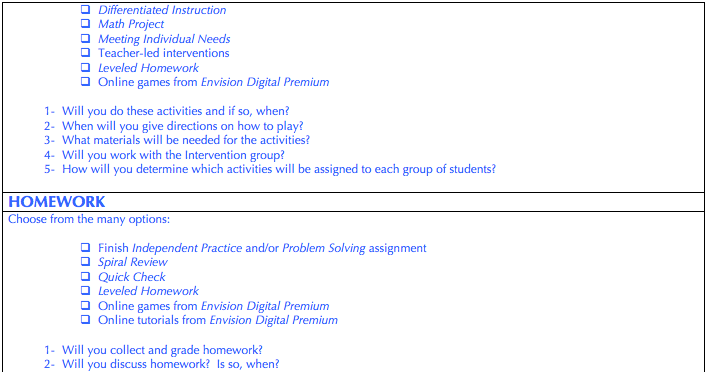


**1st – 6th grade Math Block**: The Core and More Instruction Checklist









**High Yielding Instructional Strategies**

(Teacher Directed)

Teachers at all grade levels must be prepared to provide strong initial instruction in critical skills and knowledge to their classroom as a whole and to small groups for intervention instruction. At every grade-specific skills must be taught and mastered. Teachers must be able to support student growth in critical areas by providing research based instructional strategies that include explicit and systematic instruction, ample practice opportunities, scaffolding techniques and differentiated instruction to meet student’s instructional needs.

**Explicit Instruction**

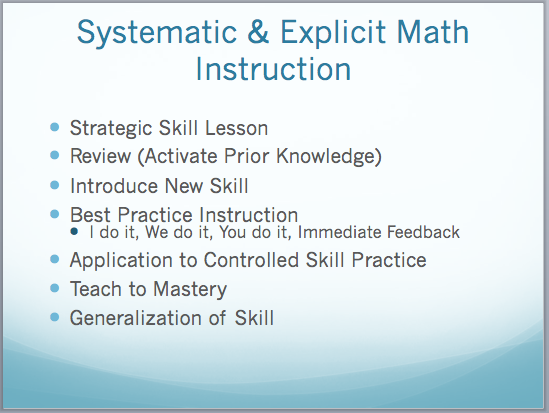
In preschool programs, explicit instruction refers to intentionally-designed learning situations that facilitate acquisition of very specific mathematical skills or concepts. Explicit instruction can be implemented and embedded within a wide variety of preschool activities including whole group, small group, learning centers, free play, as well as general classroom routines such as arrival/departure, snack, and transition times (Committee on Early Childhood Mathematics, National Research Council, 2009). Explicit instruction for school-age children means that students are told what they will learn and are given the procedural knowledge to learn. In practice, explicit instruction means that the teacher gives three types of instruction:

* Declarative - The teacher tells the students what concept/strategy they need to learn.*

* Procedural - The teacher explains and models how to use the concept or strategy.*

* Conditional - The teacher explains when the student will use the concept or strategy.*

(Ellis, Worthington, & Larkin, 1994) (Pearson & Dole, 1987).



Explicit instruction for students who struggle in math is effective in improving student learning. Explicit instruction should include providing clear models for solving a problem, using an array of examples, encouraging students to “think aloud,” and providing specific feedback (National Mathematics Advisory Panel, 2008).

**Systematic Instruction**

Systematic Instruction means that teachers provide instruction in a step-by-step manner with careful planning of the instructional sequence, including the sequence of examples. This increases the likelihood of early success with new concepts and problems that can then be supported by sequencing examples of increasing complexity. This ensures that students have an opportunity to apply their knowledge to a wide range of material and promotes the transfer of knowledge, or generalization, to unfamiliar examples (Jayanthi, Gersten, & Baker, 2008).

Systematic instruction should include ample practice opportunities that are planned for reinforcement of previously taught skills. Practice should:

* provide opportunities to apply what students have been taught in order to accomplish specific tasks,*

* follow in a logical relationship with what has just been taught in the program, and*

* provide students with opportunities to independently apply previously learned information once skills are internalized* (Moats L. , 2005).

**Scaffolded Instruction**

Scaffolded instruction is "the systematic sequencing of prompted content, materials, tasks, and teacher and peer support to optimize learning" (Dickson, Chard, & Simmons, 1993). Scaffolding is a process in which students are given support until they can apply new skills and strategies independently (Rosenshine & Meister, 1992).

When students are learning new or difficult tasks, they are given more assistance. As they begin to demonstrate task mastery, the assistance or support is decreased gradually in order to shift the responsibility for learning from the teacher to the students. Thus, as the students assume more responsibility for their learning, the teacher provides less support. This scaffolding sequence is often called “I Do, We Do, You Do.”

**Ample Opportunities for Practice with Corrective Feedback**

One aspect of instructional practice extensively supported by the research is the provision of ample opportunities for practice. The National Math Advisory Panel (2008) recommends that teachers provide students with opportunities for extensive practice. Students need supported opportunities to apply what they have been taught in order to accomplish specific math tasks. They need multiple opportunities to independently apply previously learned information once skills are mastered. However, it is important for teachers to provide students with corrective feedback along with the opportunity to practice.

Providing opportunities to practice is especially important for math computational skills. Limitations in working memory can often hinder math performance. Practice can offset this through improving automatic recall. Learning is most effective when practice is combined with instruction on related concepts because conceptual understanding promotes transfer of learning to new problems and results in better long-term retention (Riccomini P., 2010). In addition to practicing recently learned material, it is important that teachers provide frequent cumulative review (Gersten, Chard, Jayanthi, Baker, Murphy, & Flojo, 2009) to promote long-term retention of concepts and skills.

**Differentiated Instruction**

Differentiated instruction is an organized way of proactively adjusting teaching and learning to meet kids where they are and help them to achieve maximum growth as learners. Differentiation of teacher-directed instruction is a teacher’s response to learners’ needs guided by general principles of differentiation such as use of data, sequence of instruction, flexible grouping, materials and resources, and teachers and coaches collaborating in planning. It involves using multiple approaches to content, process, product, and learning environment (Tomlinson, 1999). Teachers can differentiate instruction by content (what students learn), process (how students learn), product (how students demonstrate what they learn), and learning environment (the “climate” of the classroom) (Tomlinson, 1999).

*Differentiating Content:*

 Presenting information at various levels of difficulty,

 Presenting ideas through both auditory and visual means,

 Using peer tutors,

 Meeting with small groups—re-teaching or extending content.

*Differentiating Process:*

 Tiered activities: All learners work with same important information and skills but proceed with different levels of support, challenge, or complexities,

 Provide interest centers that encourage students to explore subsets of class topic,

 Develop personal agendas,

 Provide manipulatives or other hands-on supports,

 Vary length of time a student may take to complete a task.

*Differentiating Product:*

 Provide options of how to express information learned,

 Use rubrics that match and extend varied skill levels,

 Allow students to work alone or in small groups for products,

 Encourage students to create their own product assignments.

*Differentiating Environment:*

 Provide places to work around the room that are quiet or invite collaboration,

 Provide materials that are culturally sensitive,

 Set clear guidelines for independent work that matches student needs,

 Develop routines that allow students to get help when teacher is not available (working in small groups),

 Help students understand that some learners need to move around while others sit quietly

When differentiating instruction, first determine the students’ readiness based on formative assessments, then determine the students’ interests and use this information to design instruction and monitor student progress (Tomlinson & Allan, 2000).

The following are some examples of differentiation practices for K- 12 math:

*Tiered assignments*

“In a unit on measurement, some students are taught basic measurement skills, including using a ruler to measure the length of objects. Other students can apply measurement skills to problems involving perimeter.” (Access Center)

*Interest centers*

“Centers can focus on specific math skills, such as addition, and provide activities that are high interest, such as counting jelly beans or adding the number of eyes on two aliens.”

(Access Center)

As the leadership team begins to consider important elements for the instruction of mathematics, it is important to remember that decisions about interventions and instructional practices need to be based on research results and other high-quality evidence. The tiered levels of instruction must be systematic and carefully designed to provide the instruction that all students need.

**Think-Alouds**

Students who struggle in mathematics need explicit and systematic instruction within the core as well as during math intervention time. Such practices should include clear examples and models, detailed feedback, and use of think-alouds (Gersten, Chard, Jayanthi, Baker, Murphy, & Flojo, 2009) (National Mathematics Advisory Panel, 2008). Think-alouds are a way of verbalizing steps so that students can follow the entire problem solving procedure and begin to build an automatic problem-solving repertoire. Teachers can use a think-aloud procedure to check for understanding and to aid in error analysis. In addition, informal formative assessment tools (such as exit cards) should be used to guide future instruction based on students’ levels of understanding.

**Chunking**

One other instructional practice that is important when planning math instruction is the use of “chunking”. Teachers can use chunking to break the information being presented into smaller, more manageable sets of skill- or concept-related groupings. This instructional practice is especially helpful for students with limited working memory and should be applied to planning both initial instruction and review and practice (Riccomini & Witzel, 2010).

**Peer Tutoring**

Along with scaffolding and differentiated instruction, one of the core instructional practices that is especially helpful for students who struggle with math is peer tutoring (Hall & Stegila, 2003). There are many variations of peer tutoring ranging from “pair and share” to more formal cooperative learning structures.

When working with students having difficulty, most studies implement groups of two students working together to solve problems. Cross-age tutoring shows somewhat more promise than same-age tutors; however, it poses more logistical difficulties. Peer assisted learning is effective for students with differing mathematical abilities as it provides reinforcement for students with higher levels of proficiency and provides scaffolding and verbal interaction for students having difficulties (Gersten, Chard, Jayanthi, Baker, Murphy, & Flojo, 2009). The most important ingredient for success in using peer assisted learning is that teachers must teach parameters and processes as well as the roles each student plays in the process. Effective peer tutoring uses a very structured arrangement and is not simply putting students together to work on math.

**Reciprocal peer tutoring** (RPT-M)

Reciprocal peer tutoring is another term used to further define peer assisted learning and has been shown to be effective. While it uses the same format, it is designed to help students work effectively in a group context (Fant-zo, King, & Heller, 1992). The studies were conducted within 30-minute time frames, including 20 minutes for peer tutoring sessions and 10 minutes for individual practice and checking. RPT-M improved math computation skills and also the social competencies of classroom behavior, students’ perceptions of their academic abilities, peer acceptance, and academic motivation.

**Peer Assisted Learning Strategies (PALS)**

These social competencies were also improved in the PALS strategy. Peer Assisted Learning Strategies (PALS) is an example of a highly structured reciprocal peer tutoring model designed for use in the regular classroom to achieve supplemental intervention (Fuchs, Fuchs, & Karns, 2001).

PALS uses the following protocol:

1) Mediated verbal rehearsal when the tutor models and gradually fades the procedural steps to solving a problem,

2) Step-by-step feedback by the tutor,

3) Verbal and written interaction between the tutor and pupil,

4) Application of strategies by the pupil following tutoring session, and

5) Reciprocity as students take on both roles.

**Concrete-Representational-Abstract (CRA)**

Regardless of age, students benefit from instruction that moves from concrete (drawing pictures or using manipulatives) to representational (using tally marks or number lines) to abstract (using mathematical symbols). This process allows students to make connections that promote deeper understanding of key concepts. The use of visual representations such as the CRA sequence helps students who have difficulty with computational operations or facts (Maccini & Gagnon, 2000; Miller & Mercer, 1993). CRA instruction is suited for the following concepts:

 Early number relations  Measurement  Fractions

 Place value  Geometry  Decimals

 Computation  Probability  Percentage

 Number bases  Statistics  Money

**Schema‐based Instruction (SBI)**

Schema-based instruction (SBI) is a research-based strategy for math problem solving in which students learn to recognize the schema or type of problem and associate it with a previously learned problem-solving framework. A schema serves the function of knowledge organization and can link numerical relationships to numerical operations. SBI typically includes instruction in both conceptual and procedural knowledge. Diagrams are used to represent information in word problems to help students figure out what operation is needed to solve the problem (Fuchs & Fuchs, 2002; Jitendra A., 2002; Jitendra A., 2007; Seethaler, Powell, & Fuchs undated).

**High Yielding Instructional Strategies**

**(Student Centered)**

Learning strategies are divided into two categories:

1) Cognitive strategies, including graphic organizers, checklists, note-taking, picture drawing, and asking questions; and

2) Meta-Cognitive strategies, which include self-regulating, goal setting, self-questioning, and self-monitoring.

Teaching learning strategies is critical to:

 helping students learn and remember key concepts and become more engaged,

 helping students become more independent by teaching them how to learn, and

 giving students greater confidence in their abilities.

While providing students with a number of strategies can help them, students can also be overwhelmed with the introduction of too many strategies in too short of a timeframe. Strategies should be introduced systematically and aligned with the type of math problem to be solved and should also align with identified needs of the students. Specific examples of various learning strategies are discussed below.

***Cognitive Strategy Instruction (CSI)***

According to Montague (1997), cognitive strategy instruction provides: (1) scaffolding with systematic modeling of active thinking, (2) interactive dialog among peers, (3) schedule of practice with transfer tasks, and (4) routines for students to verbalize their rationale for selecting a particular strategy. The teacher explicitly teaches strategies with a gradual release to the student of applying the strategy. Multiple strategies must be systematically taught with time provided for practice and application for each strategy prior to exposing students to situations that require self-selection of a menu of problem solving strategies. Examples of cognitive strategy instruction (CSI) include:

 Multiplication Attack Strategy – The strategy combines representations (marks) with skip counting to teach multiplication facts. It also provides pre-requisite skills needed.

 Subtraction Strategies – Various strategies are provided including count back, add to check, show with objects, use a picture, doubles (add and subtract), counting up, and zero fingers.

 Cover, Copy and Compare – Students are taught a five-step procedure to increase math fact fluency and self-evaluate their responses.

 Rules to Lower the Amount of Memorization in Math – Rules are provided for learning addition, subtraction, multiplication, and division facts.

***Mnemonics***

Mnemonics assist students who have difficulty in memorizing the steps to a mathematical procedure or strategy by using the initial letters of a multi-step process. They do not replace conceptual understanding.

***Meta‐Cognitive Strategy Instruction***

Thinking about the thought processes involved in solving problems is the basis of meta-cognitive strategies. Students who have difficulty reading and understanding a problem, identifying the important information, representing that information and developing a plan to solve a problem often have difficulty with meta-cognition (Montague & Jitendra, 2006).

 **Self-Monitoring** (Self-Regulating) Strategies – Self-monitoring strategies keep students tuned in to the task at hand, helping students solve multi-step problems.

Typically, older students use self-monitoring strategies when applying basic facts and concepts (Zrebiec, Mastropieri, & Scruggs, 2004). Included within self-monitoring strategies are self-instruction (talking oneself through the steps), self-questioning (using questions to cue certain steps, processes and behaviors) and self-checking (discussed below). An example of how to approach self-monitoring instruction, found in Resource Math Strategies, discusses a checklist process to use when teaching students to use cognitive strategies. Once the steps are mastered, students are given a mnemonic device for remembering the steps. Examples are given for subtraction, addition, and multiplication.

** Self-Checking** – This meta-cognitive strategy is used to help students think about their work once the problem is solved (Montague & Jitendra, 2006). Students are taught to check that:

* they understand the problem,
* the information matches the problem,
* the schematic representation reflects the problem,
* the plan makes sense,
* all important information is used in the plan,
* the steps are completed in the right order, and
* the answer is correct.

** Structured Organizers** – These graphic representations of checklists provide students a way to organize the information needed to solve a word problem. Students fill in the blanks (or chart) after each prompt.

Supplemental and intense supports may be delivered by a variety of qualified staff members (e.g. classroom teacher, a specialized teacher or another interventionist that has been trained for specific interventions). This decision is made by the building team and should be well defined before the process begins. Careful selection and adequate training of the staff members who are to deliver supplemental and intensive interventions is especially important in the area of mathematics. Many staff members who are not math specialists lack confidence in their knowledge of math and their own ability to provide math intervention. It is critical to carefully examine staff development needs when selecting instructors to provide math interventions.

**Professional Development for Instruction and Ensuring Fidelity**

It is imperative that the leadership team plans for the significantly challenging task of providing support to staff. In order for staff to change their instructional practices and to fully support RtI, professional development must be carefully planned and implemented.

The selection of the instructional strategies/practices is the first step. The second step is to plan ongoing support of staff to implement the necessary practices. To achieve fidelity of implementation, staff members need initial training as well as ongoing coaching and support to use these practices effectively and efficiently.

The building should also have a process in place to formally monitor implementation of the instructional practices. In this manner, response and support via coaching can be provided in a timely and encouraging manner.

Use the following steps in deciding how to support staff in the use of evidence-based instructional practices:

 Develop a plan to provide professional development to appropriate instructional staff (including ESOL, Migrant, Title, SPED, paraprofessionals, etc.).

 Determine the key elements of instruction that need to be monitored for fidelity.

 Determine a method (e.g., walk through, peer coaching, etc.) to monitor key elements for fidelity.

 Develop and implement a plan to provide training and coaching to instructional staff who need additional assistance in providing instruction as identified through monitoring. Monitor the plan for fidelity of implementation. Classroom walk-throughs can help assure fidelity of instructional practices. Examples of a classroom walk-through provide models teams can use to identify observable examples of desired instructional practices within math classrooms. The example walk-throughs can be used for creating an observation form for monitoring other key elements for instructional fidelity not included in these examples. Three examples of a classroom walk-through can be found in Resources:

 *Using Data to Improve Student Learning: School Processes—Observing a Mathematics Classroom* (Collaborative Center for Teaching and Learning, 2009)

 *High Schools that Work (HSTW) Key Mathematics Indices* (High Schools that Work, 2009)

 *What Leaders Should Look for In Effective Mathematics Classrooms* (Mathematical Sciences Education Board, 2009)

**Assessment**

**The Role of Assessment**

**Step 1: Review and Validate Universal Screening Data**

In Canyons School District, universal screening assessments, specifically Math and Literacy Curriculum-Based Measures (CBM’s) are administered a minimum of three times per year to all students K-8. After the data are collected and entered and reports have been generated, an initial review of the data occurs. Collaborative teams (classroom teachers, instructional coaches, professional learning communities, or grade level or departmental teams) typically complete this review. This initial examination of the data assures that the data are sound before using it for instructional decision-making. Following are some questions that the collaborative teams should consider when validating the screening results:

* Was the screening assessment administered with fidelity?
* Were there environmental circumstances or events in the student's life that may have impacted score results? For example, was the student sick the day of the universal screening assessment? Has a traumatic event happened recently?
* If the team lacks confidence in any score, further screening of the student's skills should be completed, preferably using alternate forms of the universal screener.
* Validated scores need to be entered in the data management system (Aimsweb) and final reports generated.

The goal of the validation process is to assure that the screening results can accurately identify which students are in need of assistance, so that appropriate intervention can start as early as possible. Validated scores need to be entered into the data management system and final reports generated. Once universal screening scores have been validated, the screening data can be used with confidence for determining (1) if students need to be assigned to intervention groups, (2) whether there is a need to obtain additional diagnostic assessment information, and (3) whether there is a good match between the instructional focus of each group and the instructional materials being used.

Remember, ensuring the validity of data does not apply only to universal screening data. All data collected throughout the implementation process, including screening, diagnostic and progress monitoring data, must be reviewed to ensure that teams have confidence in the results collected. If any individual student's scores are questionable, other data and information should be used to validate and corroborate the measure of performance.

**Step 2: Analyze Grade Level Data**

Review the grade level report or the Tier Transition Report and consider the percentage of students within the Benchmark (at or above 25%ile), Supplemental (10%ile – 24%ile) and Intensive (9%ile and below) ranges and record on the Grade Level Status tool. The team should consider the current grade level status and set a goal or review the previously determined goal for this academic year.

The goal is for schools to have 80 percent of students at Benchmark for both Missing Number and Quantity Discrimination for grades K-1, and both Computation and Concepts/Application measures for grades 2 and above. If the grade has fewer than 80 percent of students on Benchmark, then several issues should be considered:

* Are we implementing core instruction and the core curriculum with fidelity? How do we know?
* Is our core instruction explicit, systematic, and scaffolded?
* Are we teaching math concepts to mastery?
* Are we providing sufficient examples, explanations, and opportunities for practice to support new learning?
* What do the strengths and needs of this current grade make us think about in terms of differentiating the core?
* What supports or professional development are needed with the core curriculum or core instruction? If so, these need to be communicated to the building leadership.

\*Use a copy of the *Grade Level Status for Mathematics* form for your grade level to complete this step.

**GRADE LEVEL Status for Early Numeracy (Gr. K-1)**

**Question: What is our current *GRADE LEVEL* status and goal?**

Use the grade level Benchmark CBM data from Aimsweb to fill in the table below.

| Tests of Early Numeracy (TEN) | | **% At or ABOVE Benchmark** | **% AT SUpplemental** | **% At intensive** |
| --- | --- | --- | --- | --- |
| **FALL** | MISSING NUMBER (MN) |  |  |  |
| QUANTITY DISCRIMINATION (QD) |  |  |  |
| **WINTER** | MISSING NUMBER (MN) |  |  |  |
| QUANTITY DISCRIMINATION (QD) |  |  |  |
| **SPRING** | MISSING NUMBER (MN) |  |  |  |
| QUANTITY DISCRIMINATION (QD) |  |  |  |

**Considerations for Discussion**: As you evaluate grade level data, what comes to mind in terms of:

• implementing Core with fidelity

• strengths of the current group of learners

• professional development

• how these data, in combination with other data and information you have about the students help create the "whole" picture

• needed support

**Set Goal:** By Spring, we want \_\_\_\_\_\_\_\_% to be at Benchmark with their math skills.

By Midyear, we want \_\_\_\_\_\_\_\_% to be at Benchmark with their math skills.

Discussion Notes:

**GRADE LEVEL Status for Mathematics (Gr. 2-8)**

**Question: What is our current *GRADE LEVEL* status and goal?**

Use the grade level Benchmark CBM data from Aimsweb to fill in the table below.

| Math  Curriculum-Based Measures  (M-CBM) | | **% At or ABOVE Benchmark** | **% AT SUpplemental** | **% At intensive** |
| --- | --- | --- | --- | --- |
| **FALL** | Computation  (M-COMP) |  |  |  |
| Concepts/  Applications (M-CAP) |  |  |  |
| **WINTER** | Computation  (M-COMP) |  |  |  |
| Concepts/  Applications (M-CAP) |  |  |  |
| **SPRING** | Computation  (M-COMP) |  |  |  |
| Concepts/  Applications (M-CAP) |  |  |  |

**Considerations for Discussion**: As you evaluate grade level data, what comes to mind in terms of:

* implementing Core with fidelity
* strengths of the current group of learners
* professional development
* needed support

**Set Goal:** By Spring, \_\_\_\_\_\_\_\_% will be at Benchmark with their math skills.

By Midyear, \_\_\_\_\_\_\_\_% will be at Benchmark with their math skills.

Discussion Notes:

**Step 3: Analyze Classroom Level Data**

Review the class level report (rainbow report) showing the distribution of student scores for each class. Make sure the report is compared to national norms, not building or district norms.

Enter current data on the Classroom Level Status Worksheet, and compare the percentages to previous data. The percentage in each instructional recommendation category needs to be established for both the Missing Number and Quantity Discrimination in Grades K-1, and MCOMP and MCAP in grades 2 and above.

Review the classroom report, and consider the number of students within the Benchmark range (at or above the 25%ile), supplemental (10%ile – 24%ile), and Intensive (9%ile and below) ranges. The goal is for schools to have 80 percent of students On Track for both Missing Number and Quantity Discrimination for grades K-1, and both Computation and Concepts/Application measures for grades 2 and above. If the class has fewer than 80 percent of students at Benchmark, then several issues should be considered:

* Am I teaching the core with fidelity?
* Am I teaching sufficient instructional time being allocated to core math instruction?
* Is my core instruction explicit, scaffolded, and differentiated?
* Am I providing sufficient opportunities for review and practice?
* Am I using peer-tutoring strategies in core to support the needs of students with math difficulties?

Teachers should also consider how to differentiate instruction to provide a variety of curricular materials to meet the needs of a class where so many students lack adequate skills.

Collaborative teams then need to decide if any of these issues or any needs for professional development should be reported to the building leadership team.

\* Use a copy of the *Class Level Status for Mathematics* form for your grade level to complete this step.

**CLASS LEVEL Status for Mathematics (Gr. K-1)**

**Question: What is your currentstatus of MY CLASS?**

Use the class level Benchmark CBM data from Aimsweb to fill in the table below.

| Tests of Early Numeracy (TEN) | | **% At or ABOVE Benchmark** | **% AT SUpplemental** | **% At intensive** |
| --- | --- | --- | --- | --- |
| **FALL** | MISSING NUMBER (MN) |  |  |  |
| QUANTITY DISCRIMINATION (QD) |  |  |  |
| **WINTER** | MISSING NUMBER (MN) |  |  |  |
| QUANTITY DISCRIMINATION (QD) |  |  |  |
| **SPRING** | MISSING NUMBER (MN) |  |  |  |
| QUANTITY DISCRIMINATION (QD) |  |  |  |

**Considerations for Discussion**: As you evaluate class level data, what comes to mind in terms of:

• implementing Core with fidelity

• strengths of the current group of learners

• professional development

• needed support

**Set Goal:** By Spring, \_\_\_\_\_\_\_\_% will be at Benchmark with their math skills.

By Midyear, \_\_\_\_\_\_\_\_% will be at Benchmark with their math skills.

Discussion Notes:

**CLASS LEVEL Status for Mathematics (Gr. 2-8)**

**Question: What is our currentstatus of MY CLASS?**

Use the class level Benchmark CBM data from Aimsweb to fill in the table below.

| Math  Curriculum-Based Measures  (M-CBM) | | **% At or ABOVE Benchmark** | **% AT SUpplemental** | **% At intensive** |
| --- | --- | --- | --- | --- |
| **FALL** | Computation  (M-COMP) |  |  |  |
| Concepts/  Applications (M-CAP) |  |  |  |
| **WINTER** | Computation  (M-COMP) |  |  |  |
| Concepts/  Applications (M-CAP) |  |  |  |
| **SPRING** | Computation  (M-COMP) |  |  |  |
| Concepts/  Applications (M-CAP) |  |  |  |

**Considerations for Discussion**: As you evaluate grade level data, what comes to mind in terms of:

• implementing Core with fidelity

• strengths of the current group of learners

• professional development

• needed support

**Set Class Goal:** By Spring, \_\_\_\_\_\_\_\_% will be at Benchmark with their math skills.

By Midyear, \_\_\_\_\_\_\_\_% will be at Benchmark with their math skills.

**Question: Do the data indicate the need to implement a class-wide intervention?** *Check the appropriate box.*

☐ **YES:**  40% or more of class **NOT** at benchmark – Class-wide intervention needed

☐ **NO:**  More than 60% of the class **IS** at benchmark

Class-wide Intervention Plan of Action:

Discussion Notes:

**Step 4: Conduct Initial Instructional Sort**

When determining instructional groups, look at both the instructional recommendations and the instructional focus for skill development.

Using the screening data, sort students into the Four Groups for your grade level.

**Early Numeracy Group Sort (Grade K-1)**

|  |  |
| --- | --- |
| **Group 1:**   * Adequate in Missing Number (at or above 25%ile) * Adequate in Quantity Discrimination (at or above 25%ile) | **Group 2:**   * Low in Missing Number (below 25%ile) * Adequate in Quantity Discrimination (at or above 25%ile) |
| **Group 3:**   * Low in Missing Number (below 25%ile) * Low in Quantity Discrimination (below 25%ile) | **Group 4:**   * Adequate in Missing Number (at or above 25%ile) * Low in Quantity Discrimination (below 25%ile) |

**Math Group Sort (Grade 2 and above)**

|  |  |
| --- | --- |
| **Group 1:**   * Adequate in Computation (at or above 25%ile) * Adequate in Concepts/Application (at or above 25%ile) | **Group 2:**   * Low in Computation (below 25%ile) * Adequate in Concepts/Application (at or above 25%ile) |
| **Group 3:**   * Low in Computation (below 25%ile) * Low in Concepts/Application (below 25%ile) | **Group 4:**   * Adequate in Computation (at or above 25%ile) * Low in Concepts/Application (below 25%ile) |

Once the students have been placed into each group, then use highlighters to mark which students are at the Supplemental level (yellow), and which students are at the Intensive level (pink). If a student in Group 3 is at the Supplemental level in one area and at the Intensive level in the other area, the student should be marked as needing Intensive intervention (pink).

**K-1 Teachers:** Students who are low in Missing Number and Quantity Discrimination will also need to receive instruction in Oral Counting and Number Identification skills if they are below the 25%ile in those skills.

**1st grade Teachers:** First grade students who are adequate in all the early numeracy measures, but who score below the 25%ile on the Computation screening, should receive intervention for any missing computational skills. They would be included within group 1 during the sorting process.

Using the results of the initial group sort, consider whether the data indicate the need to implement a class-wide intervention. Any teacher who has a class with more than 40% of the students scoring in a single group (Groups 2, 3, or 4) needs to

1. Plan a class-wide intervention to address that weakness in students’ skills; and
2. Plan adjustments in instruction and curricular materials to support their learning needs.

If additional professional development or coaching support is needed, the collaborative team communicates those needs to the building leadership team.

\* Use a copy of the *Early Numeracy Group Sort (K-1)* or *Math Group Sort (Grades 2 and above)* form to complete this step.

**Early Numeracy Group Sort (Grade K-1)**

|  |  |
| --- | --- |
| **Group 1:**   * Adequate in Missing Number (at or above 25%ile) * Adequate in Quantity Discrimination (at or above 25%ile) | **Group 2:**   * Low in Missing Number (below 25%ile) * Adequate in Quantity Discrimination (at or above 25%ile) |
| **Group 3:**   * Low in Missing Number (below 25%ile) * Low in Quantity Discrimination (below 25%ile) | **Group 4:**   * Adequate in Missing Number (at or above 25%ile) * Low in Quantity Discrimination (below 25%ile) |

**Math Group Sort (Grade 2 and above)**

|  |  |
| --- | --- |
| **Group 1:**   * Adequate in Computation (at or above 25%ile) * Adequate in Concepts/Application (at or above 25%ile) | **Group 2:**   * Low in Computation (below 25%ile) * Adequate in Concepts/Application (at or above 25%ile) |
| **Group 3:**   * Low in Computation (below 25%ile) * Low in Concepts/Application (below 25%ile) | **Group 4:**   * Adequate in Computation (at or above 25%ile) * Low in Concepts/Application (below 25%ile) |

**Step 5: Determine What Additional Information is Needed and Complete the Diagnostic Process**

**Kindergarten teachers:** The Instructional Level for Kindergarteners is Kindergarten, so use Kindergarten materials for instruction and for progress monitoring.

**1st grade teachers:** The Instructional Level for First Graders scoring Below Benchmark (below the 25th%ile on national norms):

* Test down one grade level in the area of weakness.
* If the student scores below the 25th percentile at the Kindergarten level for the time of year, use kindergarten materials for intervention and progress monitoring.
* If the student does reach the 25th percentile at the Kindergarten level for the time of year, use first-grade-level materials for instruction and for progress monitoring.

**2nd grade and above:** Determining the Instructional Level for students scoring Below Benchmark (below the 25th%ile on national norms):

* Test down one grade level at a time in the area of weakness.
* Find the level at which the student passes (scores at or above the 25th percentile) for the time of year.
* The student’s instructional level is one grade level higher than the passing level; use this level for intervention materials and progress monitoring.
* If the student scores below the 25th percentile on the second grade probes, then the Early Numeracy probes should be administered. If the student scores at or above the 25th percentile in the Early Numeracy probes, then the first grade MCOMP probe should be given.

**All:** Use error analysis of the probes, especially the probe at the student’s instructional level, to identify specific skill weaknesses and instructional needs.

Complete final groupings of students, according to similar types and levels of skill deficits, as well as intervention intensity (Supplemental or Intensive).

At this point, diagnostic placement tests from materials that are appropriate for the intervention group can also be administered.

**Note to** **Grade 2 and above teachers**:

* For Groups 2 and 3 (low in Concepts and Applications), the error analysis should focus primarily on skill weaknesses and instructional needs in problem solving, then on math concepts and vocabulary.
* For Groups 3 and 4 (low in Computation), use single-skill CBM probes to further assess calculation difficulties, and help pinpoint instructional needs regarding computational skills. Single skill CBM probes are available under Downloads in Aimsweb.
* For students at the intermediate and secondary level, additional skill assessment with fractions should be considered for students who are low on one of the screening measures.

**A Summary of the Diagnostic Process for Grades 2 and above**

|  |  |
| --- | --- |
| **Steps for Students Low in**  **Concepts/Application**  **(Groups 2 & 3)** | **Steps for Students Low in**  **Computation**  **(Groups 3 & 4)** |
| 1. Test down one grade level at a time using Concepts/Application probes to find instructional level. | 1. Test down one grade level at a time using Computation probes to find instructional level. |
| 1. Do error analysis of probes, especially the one at instructional level, to identify areas of suspected skill deficit. | 1. Do error analysis of probes, especially the one at instructional level, to identify areas of suspected skill deficit. |
| 1. Focus error analysis primarily on problem solving skills, then on math concepts and vocabulary. | 1. Conduct follow-up single skill CBMs to further assess calculation skill deficits. |
| 1. Group students according to similar types and levels of skill deficits, as well as intervention intensity. | 1. Group students according to similar types and levels of skill deficits, as well as intervention intensity. |

**Step 6: Determine Instructional Focus for Each Student and Finalize Instructional Groupings**

Use the information from the diagnostic process (step 5) to finalize groupings around each student’s instructional level and specific skill needs.

Make sure there is a match between the student’s designated grouping and the level of Supplemental or Intensive instruction to be provided.

Review the instructional focus of each group to make sure that the planned intervention is aligned to the identified student need for that group.

Make sure there is a good match between the knowledge of the instructors and the interventions they will be teaching.

Use the *Math Grouping Worksheet* to help plan and document instructional groupings.

**Kindergarten – 1st Grade Teachers:**

* Students who are low in Missing Number and Quantity Discrimination should be grouped for instruction in Oral Counting and/or Number Identification skills if they score below the 25th percentile on those skills.
* First grade students who are adequate in all the early numeracy subtests, but who score below the 25th percentile on the Computation screening, should be grouped based on missing computational skills.

Note: Use the *Math Student Grouping Worksheet* to complete this step (page 21).

**2nd and above Teachers:**

* Group 2: Group students based on the results of diagnostic assessment of their problem-solving strategies, especially schema-based instruction.
* Group 3: Group students for instruction based on both their Computation skill needs and the Concept/Application skill needs. These students are likely to need additional time in intervention. Depending on the building’s intervention schedule, instructional groups for concepts/applications may mix students from Groups 2 and 3 and instructional groups for computation may mix students from Groups 3 and 4. However, this means that the schedule would need to allow the students in Group 3 to be enrolled in two intervention groups that meet at different times of the day. Instruction for these students should include the strategies and instructional techniques recommended for Group 2 and for Group 4.
* Group 4: Group students based on the results of diagnostic assessment of computational skill levels and deficits. Instruction should include computation strategies, use of CRA for computation instruction, and meta-cognitive strategy instruction for computation of fractions.

Students who exhibit low skills in Computation (Groups 3 and 4) should also receive instruction in basic facts for 10 minutes during each intervention period (Gersten, et al., 2009).

Note: Use the *Math Student Grouping Worksheet* to complete this step (page 37).

**Math Student Grouping Worksheet**

**Intensive Intervention Group –** Instructional Focus:\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Intervention:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Instructor:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Location:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Progress Monitoring Tool:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
Frequency of Monitoring:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| Student Receiving Intervention | Who does monitoring? |
|  |  |
|  |  |
|  |  |

**Supplemental Intervention Groups–** Instructional Focus:\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Intervention:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Instructor:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Location:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Progress Monitoring Tool:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
Frequency of Monitoring:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| Student Receiving Intervention | Who does monitoring? |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

Instructional Focus:\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Intervention:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Instructor:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Location: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Progress Monitoring Tool:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
Frequency of Monitoring:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| Student Receiving Intervention | Who does monitoring? |
|  |  |
|  |  |
|  |  |
|  |  |

**Step 7: Determine Appropriate Instructional Materials to be Used for Each Instructional Grouping**

**Kindergarten – 1st Grade teachers:** Choose appropriate interventions from those documented on the *Four Group Instructional Summary* tool for Grade K-1.

Note that the assessments to be used for progress monitoring and exit criteria for Groups 2, 3, and 4 are described in the Math *Four Group Instructional Summary* tool.

Early Numeracy skill instruction should use a concrete-representational-abstract (CRA) approach.

Students in Groups 2, 3, and 4 who are also below the 25th%ile in Oral Counting and Number Identification will need to work on those skills in addition to the focus of the group.

* These students will need to focus on the concrete and representational steps of the CRA sequence of instruction for Missing Number and Quantity Discrimination until Number Identification is mastered. Then the abstract step of using numerals can be added.

Most curricular and instructional materials for early numeracy include a wide variety of skills. When planning instruction for each group, it is important to make sure that the skill targeted for instructional focus receives the most time for instruction and practice.

After selecting the interventions, teams will need to determine and document the following items on the *Math Student Grouping Worksheet*:

* Who will provide the intervention for each group
* The instructional focus of each group
* The location where the intervention will be delivered
* The person responsible for progress monitoring

Note: Use the *Four Group Instructional Materials for Early Numeracy* for Grades K-1 to complete this step.

**2nd Grade and above:**

Choose appropriate interventions from those documented on the *Four Group Instructional Materials for Math* tool for Grades 2 and above.

Note that the assessments to be used for progress monitoring and exit criteria for Groups 2, 3, and 4 are described in the *Four Group Instructional Materials for Math* tool.

After selecting the interventions, teams will need to determine and document the following items on the *Math Student Grouping Worksheet*:

* Who will provide the intervention for each group
* The instructional focus of each group
* The location where the intervention will be delivered
* The person responsible for progress monitoring

Note: Use the *Four Group Instructional Materials for Math* for Grades 2 and above to complete this step.

**Four Group Instructional Materials for Early Numeracy for K-1**

|  |  |
| --- | --- |
| **Group 1**: Adequate in both Missing Number and Quantity Discrimination  *For first grade only*: low in computation  Focus of Instruction for First Grade   * Computation skill deficits   Focus of Instruction for Kindergarten   * Reinforce the CRA in Early Numeracy skills, beginning computation using ten frames   Materials:   * Ten Frames * Van De Walle numeracy activities * CRA * Peer-Assisted Learning Strategies (PALS) * Investigations | **Group 2**: Low in Missing Number  Adequate in Quantity Discrimination  Focus of Instruction   * Strategic counting skills * If needed, oral counting and number identification skills   Intervention Materials:   * Counting on strategies * Five Frames * Number line * Van De Walle Number Sense Strategies * Practice counting items (manipulatives) |
| **Group 3**: Low in both Missing Number and Quantity Discrimination  Focus of Instruction   * Strategic counting skills * Magnitude comparison skills * If needed, oral counting and number naming skills   Intervention Materials:   * Counting on strategies * Five Frames * Number line * Van De Walle Number Sense Strategies * CRA * Quantity comparisons using manipulatives * Practice counting items (manipulatives) | **Group 4**: Adequate in Missing Number  Low in Quantity Discrimination  Focus of Instruction   * Magnitude comparison skills * If needed, oral counting and number identification skills   Intervention Materials:   * Counting on strategies * Five Frames * Number line * Van De Walle Number Sense Strategies * CRA * Quantity comparisons using manipulatives |

**Four Group Instructional Materials for Math (Grades 2 and above)**

|  |  |
| --- | --- |
| **Group 1**: Adequate in both Computation and in  Concepts/Application  Focus of Instruction   * Core instruction with differentiation * Math content knowledge remediation or enrichment   Materials for Students with Math Difficulties:   * Peer-Assisted Learning Strategies (PALS) * Reciprocal Peer Tutoring (RPT) * Investigations (grades 1-5) * EnVision reteach materials (grades 2-6)   Materials for Students in Need of Math Extensions:   * EnVision enrichment materials (grades 2-6) * M-3 Math (grades 2-6) <http://www.gifted.uconn.edu/projectm3/meeting%20the%20needs.html> | **Group 2**: Adequate in Computation  Low in Concepts/Application  Focus of Instruction   * Concepts/application skill deficits * Problem-solving strategies * Schema-based instruction (SBI)   Intervention Materials:   * Solving Math Word Problems (SBI)   <http://proedinc.com/customer/productView.aspx?ID=4145>   * Investigations (grades 2-5) * Pirate Math (grade 3) <http://www.rti4success.org/tools_charts/popups_instruction/pirate_math_individual_tutoring_info.html> * Solve It! (grades 3-6) <http://www.mathplayground.com/wp_videos.html> * Khan Academy (grades 6-8) <http://www.khanacademy.org/> |
| **Group 3**: Low in both Computation and in  Concepts/Application  Focus of Instruction   * Computation strategies and instruction * Problem-solving strategies and instruction   Intervention Materials:   * FOCUS Math (grades 2-6) * Strategic Math Series (grade 2-6)   <http://www.edgeenterprisesinc.com/product_sets.php?category_id=9>   * Computation of Integers using CRA * Computation of Fractions using CRA * Solving Math Word Problems (SBI)   <http://proedinc.com/customer/productView.aspx?ID=4145>   * Voyager Math: V Math (for intensive) <http://www.voyagerlearning.com/vmath/index.jsp> * Corrective Math (for intensive) <http://www.mcgraw-hill.co.uk/sra/mathematics.htm> | **Group 4**: Low in Computation  Adequate in Concepts/Application  Focus of Instruction   * Review of basic facts * Computation strategies * Concrete/representational/abstract (CRA)   Intervention Materials:   * Computation Practice Probes * Cover-Copy-Compare   <http://www.interventioncentral.org/academic-interventions/math/cover-copy-compare>   * Strategic Math Series (grades 2-6)   <http://www.edgeenterprisesinc.com/product_sets.php?category_id=9>   * Great Leaps Math (grades 2-6)   <http://www.greatleaps.com/index.php?main_page=index&cPath=6>   * Computation of Integers using CRA * Computation of Fractions using CRA * Peer Tutoring   <http://www.interventioncentral.org/academic-interventions/math/peer-tutoring-math-computation-constant-time-delay> |

**Four Group Instructional Materials for Math (Grades K-1)**

|  |  |
| --- | --- |
| **Group 1**: Adequate in both Missing Number and Quantity Discrimination  *For first grade only*: low in computation  Focus of Instruction  For first grade: computation skill deficits  Materials for Students with Math Difficulties:  Materials for Students in Need of Math Extensions: | **Group 2**: Low in Missing Number  Adequate in Quantity Discrimination  Focus of Instruction   * Strategic counting skills * If needed, oral counting and number identification skills   Intervention Materials: |
| **Group 3**: Low in both Missing Number and Quantity Discrimination  Focus of Instruction   * Strategic counting skills * Magnitude comparison skills * If needed, oral counting and number naming skills   Intervention Materials: | **Group 4**: Adequate in Missing Number  Low in Quantity Discrimination  Focus of Instruction   * Magnitude comparison skills * If needed, oral counting and number identification skills   Intervention Materials: |

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